Chapter 3

Air Quality

AIR QUALITY

AMBIENT AIR

Indicator 1. Ambient Air Concentrations

Background There are numerous sources of air pollution, including point (i.e., smokestack), mobile (i.e., automobile and off-highway vehicle exhaust) and area sources (i.e., small paint shops, gas stations, open burning) in Kentucky. The federal Clean Air Act (CAA) of 1970, along with modifications in 1977 and amendments in 1990, has significantly improved the quality of air Kentuckians breathe. The CAA specifies controls for six criteria pollutants: ozone, nitrogen oxide, carbon monoxide, sulfur dioxide, particulates and lead. These pollutants can cause serious threats to human health and ecosystems and consequently have been the primary focus of federal and state air pollution programs.

The Kentucky Division for Air Quality operates a network of 98 air monitoring stations in 34 counties. The Jefferson County Air Pollution Control District operates an additional network of 29 monitors. These stations provide data used by the Environmental Quality Commission to track yearly average concentrations of air pollutants in Kentucky.

Goal Ensure ambient air is safe to breathe.

Progress Since 1980, Kentucky, as well as the nation, has witnessed significant improvements in air quality. Pollution controls on industrial sources and automobiles have resulted in a statewide trend of declining average air concentrations of criteria pollutants.

All areas of the state currently meet the national ambient air quality standard for all of the criteria pollutants, although Louisville has yet to be redesignated for meeting the 0.12 parts per million (ppm) 1-hour ozone standard. Trends reveal that air concentrations of most of these criteria pollutants continue their downward trend. For example, between 1995 and 1999, sulfur dioxide concentrations declined 10 percent, particulates fell by 7 percent, nitrogen dioxide levels dropped by 6 percent, and carbon monoxide ambient concentrations declined by 15 percent. Ozone air concentrations have fluctuated in the past several years. Between 1995 and 1999, statewide ambient air concentrations of ozone rose 2.7 percent.

At a Glance

Number of ambient air quality monitors in Ky. 127

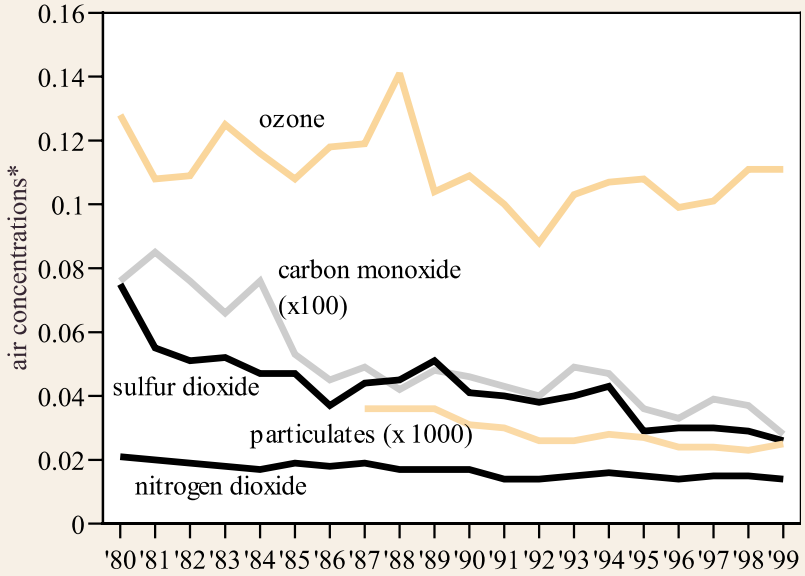
Number of counties with air quality monitors. 35

Percent decline/ increase in ambient air concentrations of pollutants (1995-1999)
ozone . . . . . +2.7%
carbon monoxide. . -15%
sulfur dioxide . . . -10%
particulates. . . . . -7%
nitrogen dioxide . . -6%

Measures - notes and sources

Measure 1*. *Concentrations from state-monitored sites based on the following: ozone: averaged second maximum, one-hour standard. Carbon monoxide: second maximum eight-hour average. Nitrogen dioxide and particulates (PM_{10}): annual statewide averages. SO_2: second maximum, 24-hour average. Concentrations in parts per million for all pollutants except particulates, which are measured in micrograms per cubic meter. Source: Ky. Division for Air Quality.*

Measure 1. Air Concentrations of Pollutants in Kentucky



Industrial Air Emissions

Indicator 2. Industrial Air Emissions

At a Glance

Number of regulated air pollution sources 2000. 3,667

Decline/increase in statewide industrial air emissions (1995-99)

SO_2. . . . . -3%
NOx. . . . . +1%
CO. . . . . +46%
VOCs . . . . . -23%
PM_{10} . . . . . -7%

Background There are thousands of sources of air pollution in Kentucky. The Kentucky Division for Air Quality and the Jefferson County Air Pollution Control District regulate point, mobile and area sources of air pollution in the state. The Division for Air Quality currently regulates 1,766 permitted, 411 registered and 159 other sources of air pollution. The division regulates 271 of these facilities as major sources, emitting 100 tons or more of air pollutants each year. The Jefferson County Air Pollution Control District regulates 789 industrial sources and 542 service stations. Of these, 21 are considered major sources.

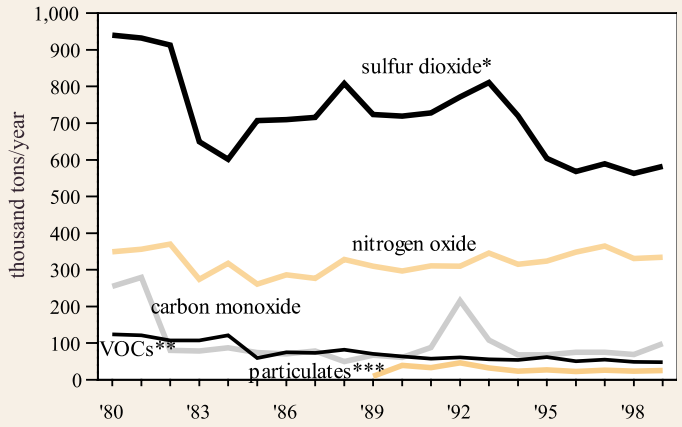
Goal Limit emissions of air pollutants to levels that meet air quality standards and protect human health and the environment.

Progress Trends reveal that environmental controls to reduce air pollution as required under the Clean Air Act have reduced emissions released by regulated sources, resulting in lower ambient air concentrations of many of the criteria air pollutants. The greatest reductions can be observed for sulfur dioxide emissions. These emissions dropped by 38 percent between 1980 and 1999. Sulfur dioxide emissions continue to decline in response to reductions required under the 1990 Clean Air Act Amendments. Between 1995 and 1999, sulfur dioxide emissions dropped by 3.5 percent.

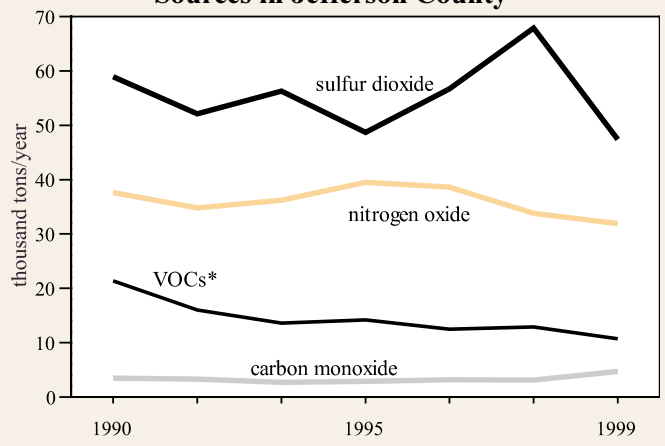
Trends reveal that nitrogen oxide and particulate emissions have remained steady during the past two decades. Nitrogen oxide emissions are expected to decline in the future due to requirements of Phase II of the national acid rain program, as well as recent U.S. Environmental Protection Agency rules to curb this pollutant.

Emissions of volatile organic compounds (VOCs), a contributor to ground-level ozone, declined by 61 percent between 1980 and 1999. In Jefferson County alone, industrial emissions of VOCs dropped by 50 percent between 1990 and 1999. The recent statewide increase in carbon monoxide emissions is attributed to updated information based on new stack testing conducted by National Southwire Aluminum in 1999, which more accurately reflects their carbon monoxide emissions.

Measure 1. Statewide Air Emissions From Regulated Sources in Kentucky (Excludes Jefferson County)



Measure 2. Air Emissions From Regulated Sources in Jefferson County



Measures - notes and sources

Measure 1. *Excludes Jefferson County because the Jefferson County Air Pollution Control District was unable to provide data for years prior to 1990. *Decline in sulfur dioxide emissions in 1983-84 may have been due to closure of Tennessee Valley Authority power plants for repairs and installation of scrubbers. **VOCs - volatile organic compounds. 1980-88 VOC data represent total hydrocarbons. ***PM_{10} collection began in 1989. Source: Ky. Division for Air Quality.*

Measure 2. **VOCs - volatile organic compounds. Data prior to 1990 not available. Source: Jefferson County Air Pollution Control District.*

Indicator 3. Ground-Level Ozone

Background Although ozone acts as a protective layer high above the earth, ground-level ozone, a main ingredient in smog, can be harmful to human health. Breathing ground-level ozone at concentrations above the health-based standards is known to cause chest pain and coughing, and may worsen bronchitis, heart disease, emphysema and asthma.

Ground-level ozone is formed when volatile organic compounds (VOCs) such as chemical solvents, gasoline vapors and oxides of nitrogen (NOx) react with sunlight. VOCs are emitted by a variety of sources, including motor vehicles, chemical plants, refineries, factories and natural sources. Nitrogen oxides are emitted from motor vehicles, power plants and other sources of combustion. High ozone levels are most prevalent during the summer months when the air is hot and stagnant. Winds can also transport ozone and other pollutants to downwind areas, exacerbating ground-level ozone.

Goal Implement and enforce requirements to meet the ozone standard (0.12 parts per million averaged over one hour) as required by federal and state law. Adopt new federal measures designed to reduce regional transport of ozone and achieve the new ozone standard (0.08 parts per million averaged over eight hours) by 2007.

At a Glance

Number of Kentucky counties in compliance with the 1-hour 0.12 ppm ozone standard. 120

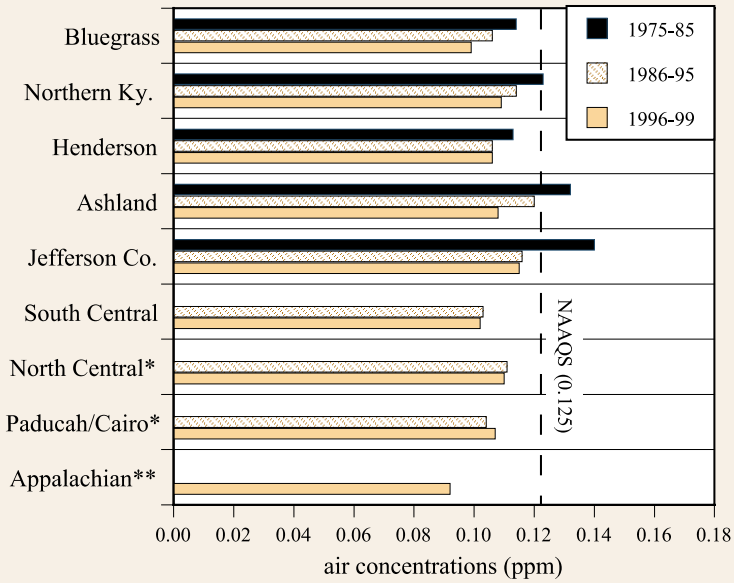
Number of Kentucky counties that will likely not meet the 8-hour 0.08 ppm ozone standard. 25

Progress Technologies to control VOCs, such as catalytic converters on automobiles, have led to a decrease in the number and severity of ozone standard exceedances in Kentucky. All but the Louisville area of Kentucky has been designated as attaining the 0.12 parts per million (ppm) standard. Although the Louisville area (Jefferson and portions of Bullitt and Oldham counties) has not been officially redesignated to attainment, air monitoring for the 1998-2000 period shows compliance with the 0.12 ppm standard. In April 2001, the state, along with the Jefferson County Air Pollution Control District filed a request to the U.S. Environmental Protection Agency (EPA) to redesignate the area to attainment for the 1-hour ozone standard.

Attainment with the 1-hour ozone standard in Jefferson County is attributed to several control measures that have been in effect in the Louisville area for several years. These include the vehicle emission testing (VET) program, the use of reformulated gasoline, and pollution controls on all major and many minor industrial and commercial sources. In 1999, the Jefferson County VET program inspected 444,315 vehicles. Of that total, 33,223 vehicles were retested after initially failing the test. A total of 10,381 vehicles did not ultimately pass subsequent retests. The county granted 1,492 waivers to failing vehicles that could not be repaired to pass the testing requirements. Changes adopted by the Kentucky General Assembly during the 2000 legislative session now exclude motorcycles, public and private buses, pre-1968 vehicles and commuter vehicles (those vehicles registered in Kentucky counties outside of Jefferson but used by owners to travel to Jefferson County workplaces), from the VET program. As a result, nearly 25,000 fewer vehicles (a 5.5 percent reduction) will now undergo annual emissions testing in Jefferson County.

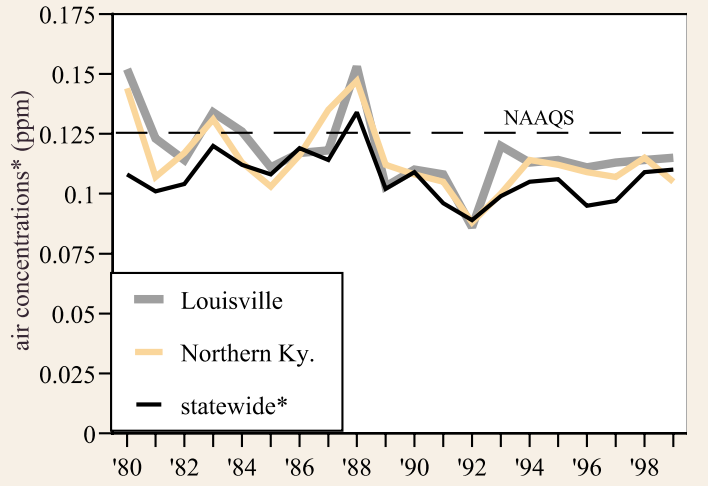
The Northern Kentucky region (Boone, Kenton, and Campbell counties) began a vehicle emissions testing program in September 1999

Measure 1. Average Regional Concentrations of Ozone (0.12 ppm 1-Hour Standard) in Kentucky

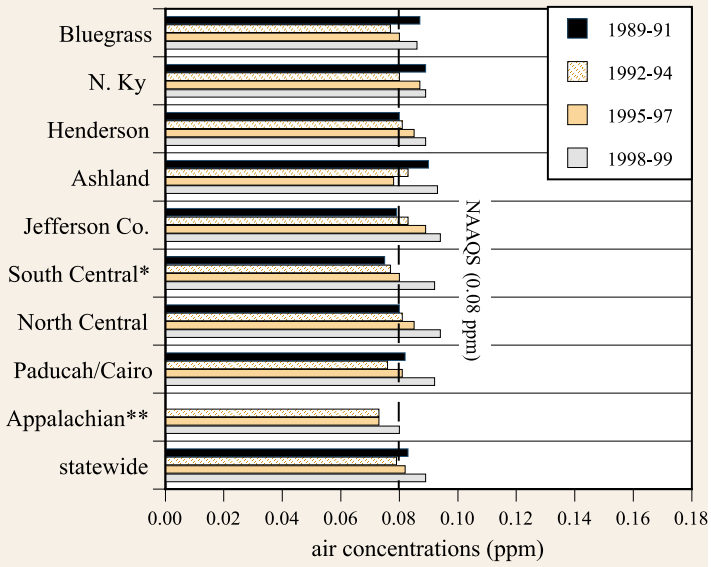


Ground-Level Ozone

Measure 2. Ground-level Ozone Concentrations (0.12 ppm 1-Hour Standard) in Kentucky



Measure 3. Regional Air Concentrations of Ground-level Ozone (0.8 ppm 8-Hour Standard)



to help reduce ozone concentrations in the area. Approximately 236,000 vehicles will be tested every two years. From September 1, 1999, through October 31, 2000, 91,814 vehicles have been tested by the Northern Kentucky program. Of those, 6,749 vehicles have failed the test and 1,848 have received waivers.

In 1997, the U.S. EPA reduced the concentration of ozone allowed in the air from 0.12 ppm to 0.08 ppm. The new standard is averaged over eight hours rather than the one hour used by the existing standard. Based on 1997-1999 monitoring data, 21 Kentucky counties will not meet the new ozone standard. Another four counties may be added to this list, based on 1998-2000 monitoring data.[1]

Soon after the 8-hour ozone air quality standard was finalized in 1997, a host of industry groups, trade organizations and three states, led by the American Trucking Association, filed a lawsuit to halt implementation of the regulations. Opponents argued that the U.S. EPA should have to consider the costs of achieving cleaner air when setting standards. In Feb. 2001, the Supreme Court overturned an earlier circuit court ruling, upholding the rights of the U.S. EPA to set health-based standards and rejecting arguments that the agency must balance the negative health effects of pollution against the economic effects of the regulation. However, the court also rejected the U.S. EPA's rules on implementing new rules for ground-level ozone and ordered the agency to develop a more "reasonable" interpretation of the law.

Footnotes

***1**. The 21 counties not meeting the 8-hour ozone standard based on 1997-99 monitoring data are: Boone, Boyd, Bullitt, Cambpell, Christian, Daviess, Edmonson, Fayette, Graves, Greenup, Hancock, Henderson, Jefferson, Kenton, Livingston, McCracken, McLean, Oldham, Scott, Simpson and Trigg. The four additional counties not meeting the 8-hour ozone standard based on 1998-2000 monitoring data are: Bell, Carter, Hardin and Pulaski.*

Measures - notes and sources

***Measure 1**. NAAQS - National Ambient Air Quality Standard. *Less than 10 years of data available for 1976-85. **Less than 10 years of data available for 1986-95. Based on second maximum one-hour ozone average. Source: Ky. Division for Air Quality.*

***Measure 2**. NAAQS - National Ambient Air Quality Standard. *Excludes monitors from Boone, Kenton, Campbell, Jefferson, Oldham and Bullitt counties. Based on second maximum one-hour ozone standard. Source: Ky. Division for Air Quality.*

***Measure 3**. NAAQS - National Ambient Air Quality Standard. Based on the regional 3-year average of eight-hour fourth maximum ozone standard with the exception of a 2-year average for 1998-99. *Data not available for 1989-90. **Data not available for 1989-91. Source: Ky. Division for Air Quality.*

Indicator 4. Nitrogen Dioxide

Background National ambient air quality standards limiting the amount of nitrogen dioxide in the air were established because high concentrations are known to impair human health. Nitrogen oxides also combine with water to form acids and contribute to the formation of acid rain and ground-level ozone. Nitrogen dioxide (NO_2), a brownish mixture produced by fossil fuel combustion from sources such as cars and power plants, belongs to a family of highly reactive gases called nitrogen oxides (NOx).

During 1998, a total of 679,377 tons of NOx emissions were emitted in Kentucky.[1] Nearly half (47 percent) of these emissions came from coal-fired power plants (320,228 tons). Vehicles were responsible for 23 percent of the NOx emissions (156,058 tons).

Goal Implement and enforce requirements to meet the national standard of 0.05 ppm for nitrogen dioxide and to further reduce NOx emissions to meet other federally mandated requirements under the Clean Air Act. Specifically, two other control programs to lower ambient NOx levels have been mandated by the U.S. Environmental Protection Agency (EPA). The acid deposition provisions of the 1990 Clean Air Act Amendments require specific reductions from large NOx sources, primarily power plants.

In 1998, the U.S. EPA adopted a program to further reduce NOx emissions in the eastern half of the United States. Those reductions, generally referred to as the NOx SIP Call, are scheduled to be in place by May 2004. Adopted primarily as an aid for attainment and maintenance of the 1-hour ozone standard, these controls are anticipated to also aid in improving visibility and fine particulate pollution.

Progress Air concentrations in all regions of the state remain below the national standard for NO_2. While several individual power plants in Kentucky have reduced NOx emissions, total statewide nitrogen oxide emissions released from power plants increased by 11 percent between 1980 and 1999.

Kentucky is one of 19 states and the District of Columbia that must reduce the amount of

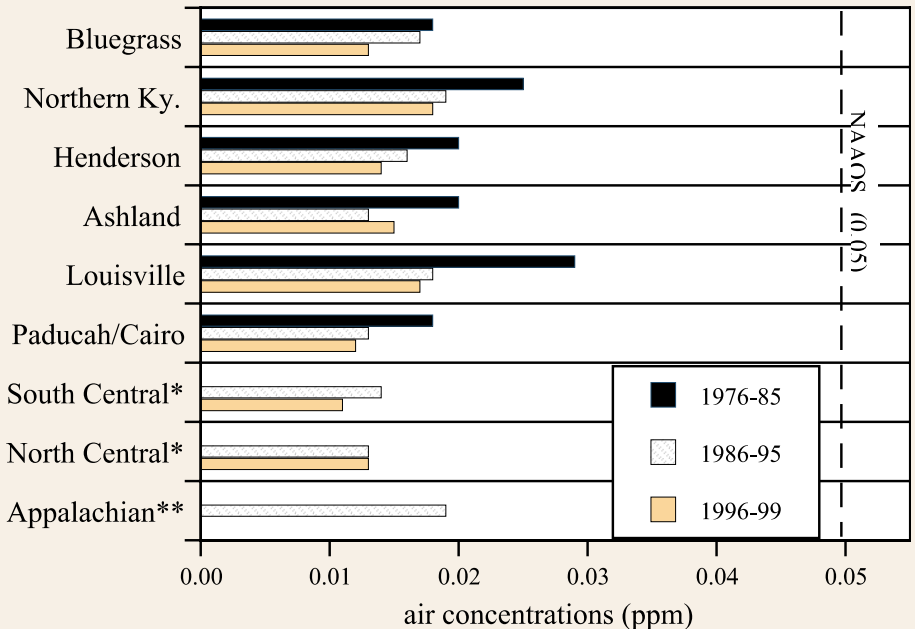
At a Glance

Number of Kentucky counties in compliance with NOx standard . 120

Principal sources of NOx emissions in Kentucky (1998)
power plants. 47%
highway vehicles . . 23%
off-highway 14%
industrial fuel combustion 12%

NOx power plant emissions in Kentucky
1980. . . . . .286,560 tons
1999. . . . . .319,457 tons

Measure 1. Regional Air Concentrations of Nitrogen Dioxide



Nitrogen Dioxide

Measure 2. Nitrogen Oxide Emissions from Power Plants in Kentucky

County	Facility	1980 tons	1990 tons	1999 tons	1980-99 % change
McCracken	TVA – Shawnee	32,065	25,349	37,912	+18
Muhlenberg	Ky. Utilities - Green	2,873	4,162	3,287	+14
Muhlenberg	TVA - Paradise	127,451	97,787	109,636	- 14
Ohio	W. Ky. Energy - Wilson	N/A	6,355	8,242	+30
Daviess	OMU	14,855	10,871	12,522	- 16
Hancock	W. Ky. Energy - Coleman	23,790	14,696	6,473	- 73
Henderson	Henderson Mun. Power	292	160	211	- 28
Webster	W. Ky. Energy - Reid*	10,736	9,839	6,824	- 36
Webster	W. Ky. Energy - Green	5,940	8,292	7,059	+19
Boone	Cinergy - East Bend	N/A	11,442	10,114	- 12
Carroll	Ky. Utilities - Ghent	20,226	22,980	27,962	+38
Bell	Ky. Utilities - Pineville	216	204	511	+136
Clark	E. Ky. Power - Dale	1,692	2,481	3,378	+99
Clark	E. Ky. Power - Smith	N/A	N/A	258	--
Fayette	Ky. Utilities - Haefling	28	26	19	- 32
Mercer	Ky. Utilities - Brown	12,046	11,319	8,435	- 30
Woodford	Ky. Utilities - Tyrone	449	518	815	+81
Lawrence	Am. Elec. Power - Big Sandy	N/A	25,249	20,376	- 19
Mason	E. Ky. Power - Spurlock	N/A	12,090	18,043	+49
Pulaski	E. Ky. Power - Cooper	3,177	6,594	4,087	- 38
Jefferson	LG&E - Mill Creek	16,391	19,475	18,499	+13
Jefferson	LG&E - Cane Run	14,333	8,674	7,202	- 50
Trimble	LG&E - Trimble	N/A	2,166	7,592	+250
Total	**23**	**286,560**	**300,729**	**319,457**	**+11**

NOx emitted from coal-burning power plants and other major combustion sources under a new U.S. EPA rule. The new rule is intended to reduce NOx emissions by 1.1 million tons per year in the eastern United States by the year 2004. The rule calls for reducing NOx emissions from electric generating units in Kentucky by approximately 66 percent. The plan also specifies a 60 percent reduction from large industrial boilers and a 30 percent reduction from large cement kilns. Kentucky will be responsible for emission cutbacks of 75,000 tons per ozone season (May through September). The Division for Air Quality has drafted regulations to implement the NOx reduction requirements.

Footnotes

***1**. NET Tier Report, Airsdata (1998), U.S. Environmental Protection Agency, 2000.*
***2**. Ibid.*

Measures - notes and sources

***Measure 1**. NAAQS - National Ambient Air Quality Standard. *Less than ten years of data available. ** Only one year of data available. Based on annual average at state monitored sites. Source: Ky. Division for Air Quality.*
***Measure 2**. *Includes Henderson units 1 & 2. N/A-no monitoring. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District.*

Indicator 5. Sulfur Dioxide

Background Sulfur dioxide is a pungent, colorless gas that can cause respiratory illness and aggravate existing cardiovascular disease. Certain human populations are particularly sensitive to sulfur dioxide, including children, the elderly, asthmatics and individuals with chronic lung disease. Sulfur dioxide can also damage the foliage of trees and agricultural crops and is a major precursor to acid rain.

Sulfur dioxide (SO_2) is formed when fuel containing sulfur is burned. In Kentucky, 753,024 tons of sulfur dioxide emissions were emitted during 1998.[1] Coal-fired power plants were the leading source of SO_2 emissions. The Tennessee Valley Authority's Paradise Power Plant in Muhlenberg County led with 26 percent (153,928 tons) of the SO_2 power plant emissions, followed by American Electric Power's Big Sandy Plant in Lawrence County with 67,164 tons and Kentucky Utilities' Ghent Plant in Carroll County with 58,213 tons.

Goal Implement and enforce requirements to meet the national ambient air quality standard of 0.14 ppm for sulfur dioxide and the requirements of the 1990 Clean Air Act Amendments, which specify a 40 percent reduction in SO_2 emissions by the year 2000 (using 1980 as the baseline) as part of the Acid Deposition Control Program.

Progress The National Ambient Air Quality Standard for sulfur dioxide is being met throughout Kentucky, although the southern portion of Boyd County has not yet been redesignated as being in attainment.

Ongoing efforts by power plants to curb SO_2 emissions, as part of the 1990 national Acid Deposition Control Program, have likely contributed to the declining SO_2 air concentrations in some regions of the state. Total sulfur dioxide emissions from power plants in Kentucky fell 42 percent between 1980 and 1999 while the amount of coal burned at these plants increased 10.8 percent (from 31.1 million tons in 1980 to 34.46 million tons in 1999). Of the state's 23 power plants, 12 reduced sulfur dioxide emissions between 1980 and 1999. Additional SO_2 reductions are slated as part of Phase II of the national Acid Deposition Control Program. All power plants in Kentucky are in compliance with the acid rain requirements.

Kentucky's rainfall has become less acidic over the years, possibly due to the reduction of sulfur dioxide emissions. Data from monitoring stations in three eastern Kentucky counties reveal that the average pH of rainfall has become slightly less acidic in the past 12 years. The drop in pH in 1997 and 1998 is attributed to meteorological events, such as low rainfall levels that year, according to officials at the National Atmospheric Deposition Program.

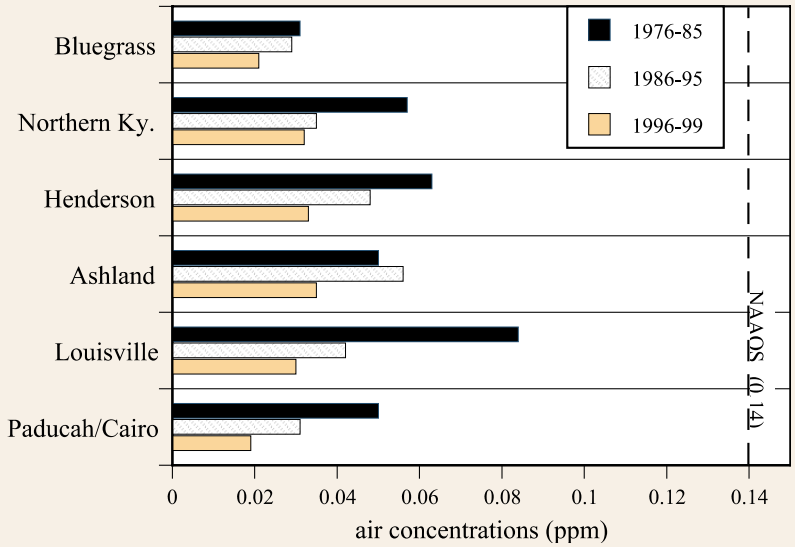
At a Glance

Number of Kentucky counties in compliance with SO_2 standard . 120

Principal sources of SO_2 emissions in Kentucky (1998)
power plants. 83%
industrial fuel combustion 7.5%
off-highway 3.5%

Power plant SO_2 emissions
1980. . . . 1,036,850 tons
1999. . . . . .595,585 tons

Measure 1. Regional Air Concentrations of Sulfur Dioxide in Kentucky



Footnotes

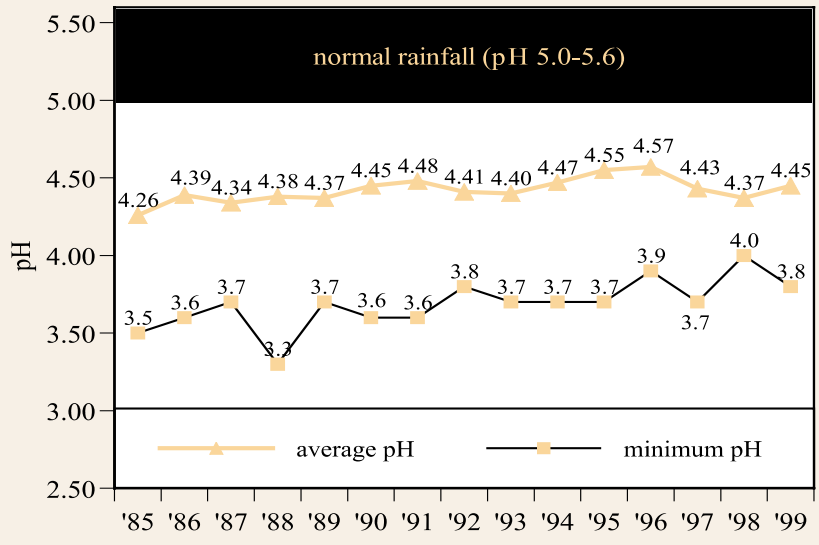
1. NET Tier Report, Airsdata (1998), U.S. Environmental Protection Agency, 2000.

Sulfur Dioxide

Measure 2. Sulfur Dioxide Emissions from Power Plants in Kentucky

County	Facility	1976 tons	1980 tons	1999 tons	1980-99 % change
McCracken	TVA – Shawnee	288,000	86,961	32,624	-62
Muhlenberg	Ky. Utilities - Green River	27,000	13,529	18,460	+36
Muhlenberg	TVA-Paradise	456,000	372,654	153,928	-58
Ohio	W. Ky. Energy - Wilson	N/A	N/A	10,415	—
Daviess	OMU	74,000	45,159	8,403	-81
Hancock	W. Ky. Energy – Coleman	100,000	78,650	36,406	-54
Henderson	Henderson Mun. Power	9,000	1,526	1,479	-3
Webster	W. Ky. Energy – Reid*	81,000	53,443	13,200	-75
Webster	W. Ky. Energy – Green	N/A	7,618	4,844	-36
Boone	Cinergy - East Bend	N/A	N/A	18,096	—
Carroll	Ky. Utilities – Ghent	76,000	84,553	58,213	-31
Bell	Ky. Utilities – Pineville	1,000	467	1,082	+131
Clark	E. Ky. Power - Dale	8,000	3,929	8,483	+115
Clark	E. Ky. Power - Smith	N/A	N/A	263	—
Fayette	Ky. Utilities - Haefling	5	5	.02	-100
Mercer	Ky. Utilities – Brown	57,000	53,153	45,956	-13
Woodford	Ky. Utilities - Tyrone	2,000	1,081	1,772	+63
Lawrence	Am. Elec. Power Big Sandy	60,000	61,617	67,164	+9
Mason	E. Ky. Power - Spurlock	NA	19,322	35,979	+86
Pulaski	E. Ky. Power - Cooper	35,000	12,743	19,331	+51
Jefferson	LG&E - Mill Creek	112,039	107,491	26,864	-75
Jefferson	LG&E - Cane Run	109,578	32,904	17,878	-46
Trimble	LG&E – Trimble	NA	NA	14,745	—
Total	**23**	**1,495,622**	**1,036,805**	**595,585**	**-42**

Measure 3. Average pH of Rainfall at Monitored Sites in Kentucky



Measures - notes and sources

***Measure 1**. NAAQS - National Ambient Air Quality Standard. Based on second maximum 24-hour average. Source: Ky. Division for Air Quality.*

***Measure 2**. *Includes Henderson Units 1 & 2. NA - Not operating. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District.*

***Measure 3**. Volume-weighed averages from monitored sites in Washington, Letcher, Trigg and Rowan counties. Values have changed slightly from previous reports based on data retrieval. Source: National Atmospheric Deposition Program, Illinois State Water Survey.*

Indicator 6. Carbon Monoxide

Background Carbon monoxide (CO) is a colorless, odorless gas formed when the carbon in fuel is not burned completely. Carbon monoxide may cause serious health problems, including dizziness and slowed reflexes, when the standard is exceeded. At very high levels, CO is poisonous and can lead to death.

During 1998, sources emitted 1.37 million tons of CO.[1] Highway vehicles accounted for 68 percent of CO emissions in Kentucky during 1998, followed by off-highway at 16 percent, fuel combustion (7 percent), waste disposal and recycling (3 percent), metals processing (2 percent) and other (4 percent).

Goal Implement and enforce requirements to meet the national standard of 9.0 ppm for carbon monoxide using various emission control programs and technologies.

Progress All regions of the state currently meet the CO standard. Air concentrations of CO continue to decline in all regions of the state. The decline of CO air levels are attributed to pollution controls on automobiles, including national standards for tail pipe emissions, new vehicle technologies, and clean fuels programs such as the use of reformulated gasoline.

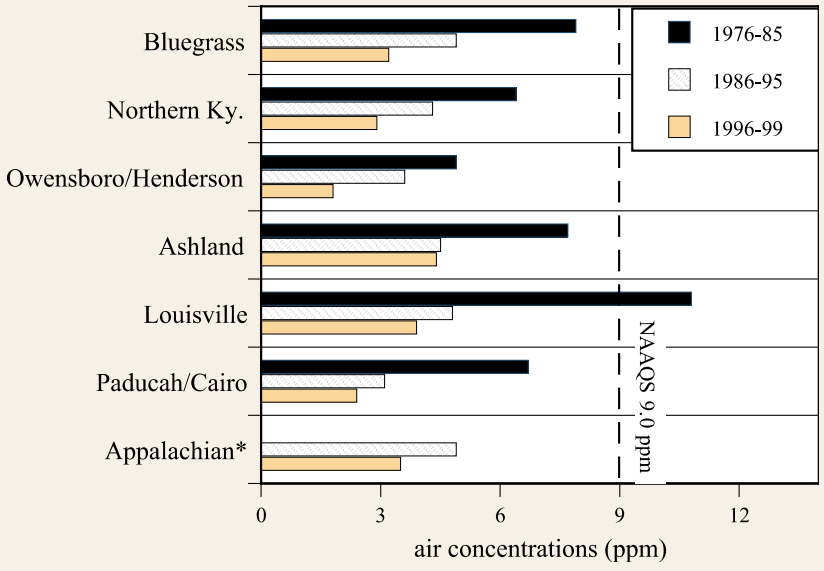
National concerns, however, regarding the use of reformulated gasoline were raised after MTBE (methyl tertiary butyl ether)—one of two fuel oxygenates used in reformulated gas to help improve air quality—was detected in groundwater. The U.S. Environmental Protection Agency (EPA) classifies MTBE as a possible human carcinogen. Reformulated gasoline is used in Louisville and in Northern Kentucky. State environmental officials note, however, that MTBE is not considered a problem in Kentucky due to the nature of the state's soils and geology, the lack of widespread use of MTBE in the state, and stringent cleanup standards for leaking underground storage tanks. According to an assessment conducted by the Kentucky Department for Environmental Protection, MTBE has been detected at seven (5.2 percent) of the 134 sites sampled in the state's groundwater ambient monitoring network.[2] Tests also revealed MTBE detections at 17 (20 percent) of the 85 lakes sampled and at 10 public drinking water systems. State officials have concluded that MTBE is not a problem in most Kentucky waters, but that the contaminant is of public concern and warrants continued monitoring.

At a Glance

Number of Kentucky counties in compliance with CO standard. . . 120

Leading sources of CO emissions in Kentucky (1998)
highway vehicles. . . 68%
off-highway 16%
fuel combustion. 7%

Measure 1. Regional Air Concentrations of Carbon Monoxide in Kentucky



Footnotes

1. NET Tier Report, Airsdata (1998), U.S. Environmental Protection Agency, 2000.

2. MTBE: Summary of Program Sample Analyses, Feb. 15, 2001, Ky. Department for Environmental Protection.

Measures - notes and sources

***Measure 1**. NAAQS - National Ambient Air Quality Standard. *Less than ten years of data available for 1986-95. Based on second maximum 8-hour average. Source: Ky. Division for Air Quality.*

Particulates

Indicator 7. Particulate Matter

At a Glance

Number of counties in compliance with PM_{10} standard. 120

Principal sources of PM_{10} emissions in Kentucky (1998)
fugitive dust. 40%
agriculture/forestry. 12.4%
residential wood combustion 9.7%
open burning. 7.5%

Principal sources of $PM_{2.5}$ emissions in Kentucky (1998)
fugitive dust. . . .60.8%
agriculture and forestry. 20%
residential wood combustion 3%
open burning. 2.4%

Background Particulates are small particles of dust, dirt, chemicals and soot in the air. Concerns about the impacts of particulates on public health prompted the U.S. Environmental Protection Agency (EPA) to issue a PM_{10} standard in 1987 to control particulates that are 10 microns in diameter or smaller. Health effects from exposure to PM_{10} include breathing and respiratory problems, cancer and premature death. The elderly, children and people with chronic lung disease are especially sensitive to particulate matter.

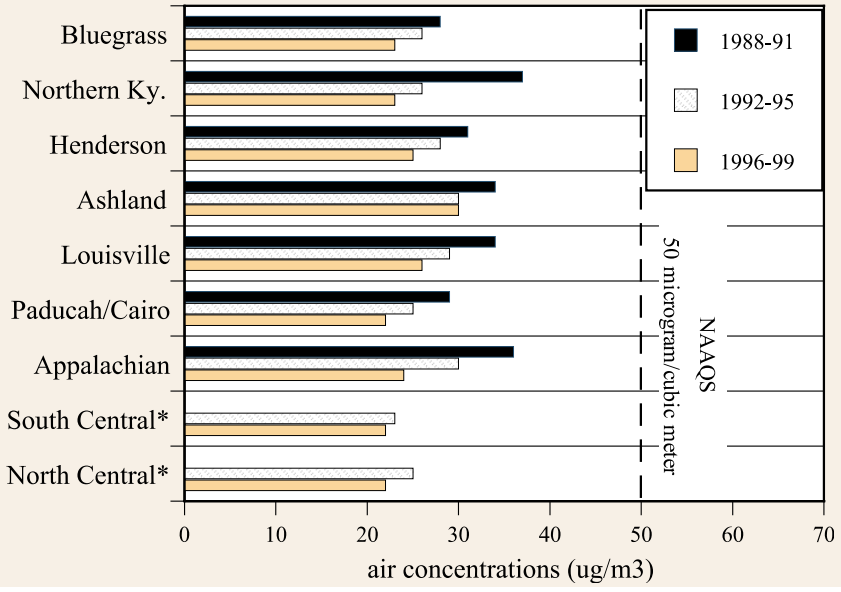
In 1997, the U.S. EPA issued new health-based standards for particulates less than 2.5 microns in diameter. Based on new health studies, these smaller particulates can be inhaled more deeply into the lungs than PM_{10} particulates. The new $PM_{2.5}$ standard along with the 8-hour ozone standard were challenged by the American Trucking Association, the U.S. Chamber of Commerce and other state and business groups who claimed the U.S. EPA misinterpreted the Clean Air Act in regard to setting air standards. In Feb. 2001, the Supreme Court overturned an earlier circuit court ruling, upholding the rights of the U.S. EPA to set health-based standards and rejecting arguments that the agency must balance the negative health effects of pollution against the economic effects of the regulation.

Particulates are emitted from cars, construction sites, mineral and metal processes, coal-fired power plants, agricultural operations and roads. During 1998, 102,485 tons of $PM_{2.5}$ were emitted and 345,078 tons of PM_{10} emissions were emitted.[1] The largest source was fugitive dust, followed by agriculture and forestry activities, residential wood fuel combustion and open burning.

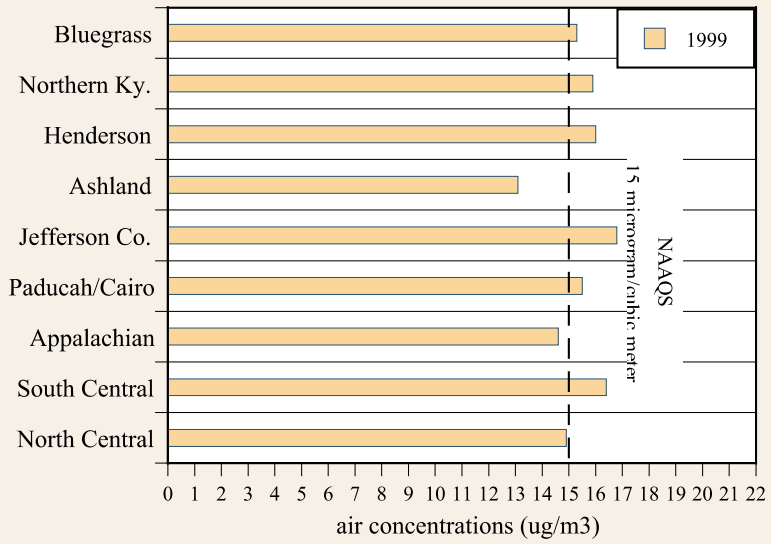
Goal Implement and enforce requirements to meet the national PM_{10} standard of 50 micrograms per cubic meter for particulate matter. Collect data and information using the new federal $PM_{2.5}$ standard for particulate matter less than 2.5 microns in diameter and enforce provisions as required.

Progress Air monitors began measuring particulates based on the PM_{10} standard in 1987. All regions of the state currently meet the PM_{10} standard. In 1999, 22 new $PM_{2.5}$ monitoring

Measure 1. Regional Air Concentrations of Particulates (PM_{10}) in Kentucky



Measure 2. Regional Air Concentrations of Particulates ($PM_{2.5}$) in Kentucky



stations in 18 counties began measuring compliance with the new $PM_{2.5}$ standard. Monitoring data reveals problems meeting the standard in six of the state's nine air quality control regions. The highest $PM_{2.5}$ levels were found in the Jefferson County.

Footnotes

1. NET Tier Report, Airsdata (1998), U.S. Environmental Protection Agency, 2000.

Measures - notes and sources

***Measure 1**.*Data prior to 1992 not collected. Based on annual arithmetic mean. Source: Ky. Division for Air Quality.*

***Measure 2**. Data collection for $PM_{2.5}$ began in 1999. *1999 data does not meet quality assurance requirements, which prohibits its use for regulatory purposes, but it can be used for planning purposes. Source: Ky. Division for Air Quality.*

Enforcement and Compliance

Indicator 8. Enforcement and Compliance

At a Glance

Air pollution sources regulated in Kentucky
. 3,667

Number of air pollution inspections
1995 5,000
1999. 6,086

Air quality complaints
1995 2,572
1999. 2,407

Air pollution violations
1995. 1,001
1999 964

Air pollution sources assessed penalties
1995 333
1999 96

Air pollution penalties
1995. . . . . .$1,056,500
1999 . . . . . .$830,855

Background The Kentucky Division for Air Quality is the principal agency responsible for monitoring and implementing clean air regulations in the state. In addition, the Jefferson County Air Pollution Control District was created in 1952 and was approved in 1970 by the U.S. Environmental Protection Agency (EPA) to implement the provisions of the Clean Air Act for Jefferson County and metropolitan Louisville.

The Division for Air Quality currently regulates 2,336 industrial and commercial sources of air pollution, while the Jefferson County Air Pollution Control District regulates 789 facilities and 542 service stations. During 1999, the Division for Air Quality conducted 4,185 inspections, while the Jefferson County Air Pollution Control District conducted 1,901 routine inspections of permitted facilities or inspections in response to a complaint.

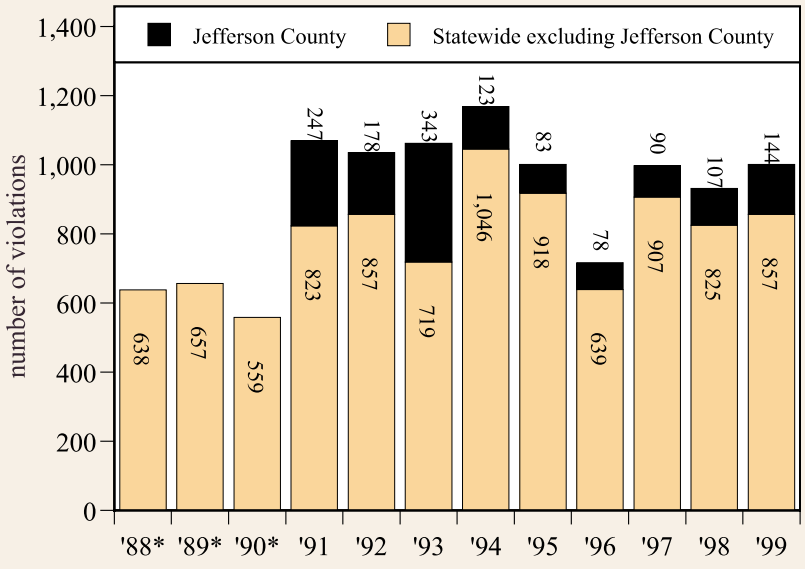
Goal Ensure air pollution control requirements are met by enforcing air quality regulations, permits and enforcement actions.

Progress In 1999, 857 violations of air quality rules were cited by the Kentucky Division for Air Quality (276 at permitted facilities, 518 at area sources, and 63 asbestos violations). These include administrative actions as well as violations of permit limits. The Jefferson County Air Pollution Control District issued 107 notices of violation in 1999 (34 at permitted facilities, 34 at gas stations, 11 for open burning and 28 asbestos and other sources).

Some of the violations cited were the result of complaint investigations. In 1999, 1,675 air quality complaints were received by the Kentucky Division for Air Quality while 760 complaints were received by the Jefferson County Air Pollution Control District. The greatest percentage of complaints received by the Division for Air Quality concerned odor (37 percent), which was followed by dust (28 percent), open burning (25 percent), asbestos (4 percent) and other sources such as fumes, vapor, noise and dumping (6 percent).

Many violations cited by the Kentucky Division for Air Quality are resolved at the regional office level without the assessment of penalties, but some violations result in formal referral to the Frankfort Central Office for penalty assessment. In 1999, the state assessed penalties in

Measure 1. Air Quality Violations Cited in Kentucky



Measure 2. Air Quality Penalty Assessments in Kentucky

Year	State ($)*	Jeff. Co. ($)**
1990	126,500	N/A
1991	1,698,375	N/A
1992	N/A	282,000
1993	847,425	377,000
1994	366,650	N/A
1995	976,500	80,000
1996	1,208,247	35,000
1997	507,450	45,000
1998	850,431	44,220
1999	761,950	68,925
2000	579,500	81,615

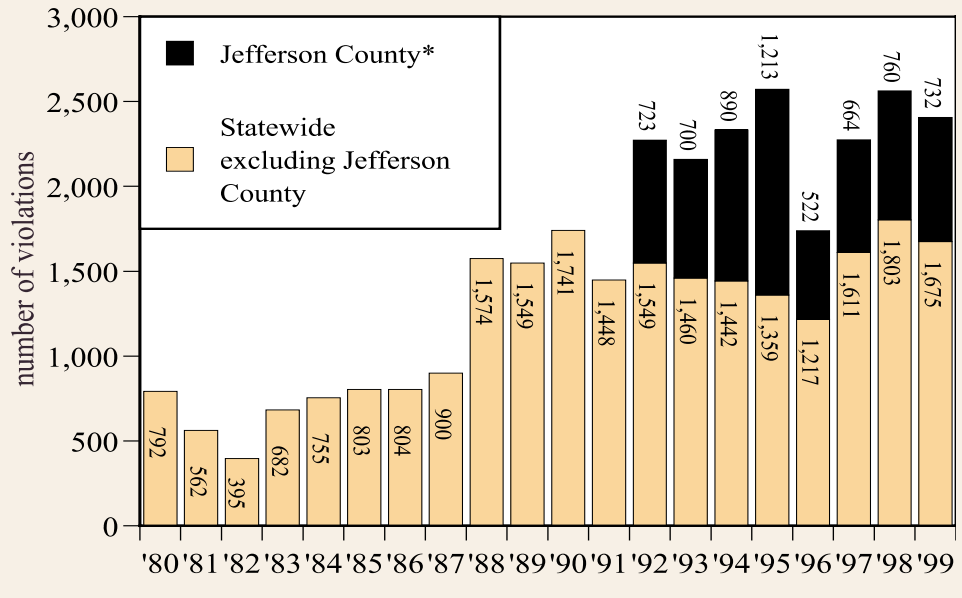
the amount of $761,950 against 15 industrial facilities, 10 commercial contractors, eight individuals, five businesses, three government/public facilities and three schools. The Jefferson County Air Pollution Control District assessed 83 penalties against 52 sources. The Division for Air Quality also worked to resolve violations through the use of Supplemental Environmental Projects (SEPs). During 1999, 10 SEPs were implemented by responsible parties to mitigate $163,400 in penalties. Recent projects included placing ads in newspapers regarding open burning, cleaning up dumps, attending asbestos training, and the installation of pollution control equipment beyond what is required by state regulations.

Measures - notes and sources

***Measure 1**. 1990 statewide data not available. Includes all violations cited by the Ky. Division for Air Quality. *Jefferson County data not available. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District.*

***Measure 2**. N/A – data not available. *Calendar year. **Federal fiscal year. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District.*

Measure 3. Air Quality Complaints in Kentucky



Ozone Depletion

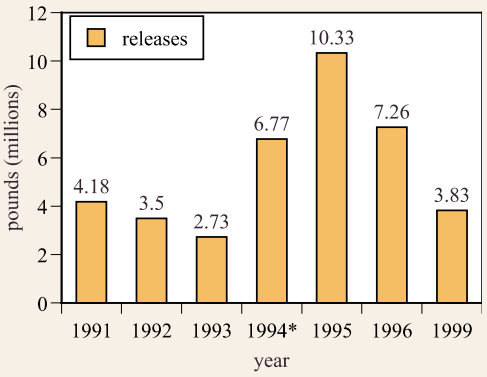
Indicator 9. Ozone Depletion

At a Glance

Generation of ozone depleting chemicals in Kentucky (million pounds)
1991. . . . . 4.18
1995. . . . . 10.33
1999. . . . . 3.83

Background The earth's stratospheric ozone layer protects against the sun's harmful ultraviolet (UV) rays, but human activities have damaged this shield. While ozone concentrations vary naturally, scientists have found that the ozone shield is being depleted well beyond changes due to natural processes. A diminished ozone layer allows more radiation to reach the earth's surface. For people, overexposure to UV rays can lead to skin cancer, cataracts, and weakened immune systems. Increased UV rays can reduce crop yields and disrupt the marine food chain. In the early 1970s scientists began investigating the effects of various chemicals on the ozone layer, particularly chloroflorocarbons (CFCs), which contain chlorine. CFCs are used as refrigerants, solvents, and blowing agents. Other chlorine-containing compounds include methyl chloroform, a solvent, and carbon tetrachloride, an industrial chemical. When CFCs reach the stratosphere, the radiation from the sun causes them to break apart and release chlorine atoms which react with ozone, starting the chemical cycle of ozone destruction. Similarly, when halons (fire extinguishing agents) and methyl bromide (a soil fumigant) are broken apart, they release bromine atoms, which are 40 times more destructive to ozone molecules than chlorine atoms.

Measure 1. Generation of Ozone Depleting Chemicals in Kentucky



Measure 2. Top 10 Companies Releasing Ozone Depleters

Company (County)	Releases (lbs) 1996	1999
DuPont, Louisville Plant (Jefferson)	3,907,778	1,869,560
Atofina Chemicals Inc. (Marshall)	2,226,870	469,378
GE Appliancess (Jefferson)	317,000	433,760
U.S. Enrichment Corp. (McCracken)	176,750	382,000
Louisville Packaging (Jefferson)	123,600	330,669
Firestone Abuilding Prod. (Kenton)	123,170	156,371
Topy Corp. (Franklin)	105,016	113,750
Arch Chemicals Inc. (Meade)	68,718	59,731
Westlake Monomers Corp. (Marshall)	51,655	6,800
Hendrix & Dail Inc. (Franklin)	45,400	2,100
Total top 10	7,145,957	3,824,119
Total State	7,257,430	3,826,336

Goal Phase out production of CFCs and other ozone depleters as specified in the Montreal Protocol.

Progress The *Montreal Protocol on Substances that Deplete the Ozone Layer* was adopted by the United Nations Environment Program in 1987. Since then, 175 nations have ratified the protocol.[1] The Protocol's chief aim is to reduce and eventually eliminate the production and use of man-made ozone depleting substances. As part of the United States' commitment to implementing the Montreal Protocol, the U.S. Congress amended America's Clean Air Act, adding provisions for the protection of the ozone layer. Most importantly, the amended Act required the gradual end to the production of chemicals that deplete the ozone layer.[2]

Data from the 1999 Toxic Release Inventory report revealed that 15 companies in Kentucky released 3.83 million

pounds of ozone-depleting chemicals. Four ozone depleting chemicals accounted for almost 96 percent of the reported air releases in Kentucky (HCFC-22, HCFC-141b, CFC-114, and HCFC-142b). As was the case in previous years, Kentucky reported more on-site releases of ozone depleters in 1999 than any other state in the nation. DuPont's Louisville Plant accounted for 49 percent of the total ozone-depleting releases reported in the state during 1999. However, the generation of ozone depleting chemicals in Kentucky is declining. In 1996, 21 Kentucky companies released 7.25 million pounds of ozone-depleting chemicals, more than twice the amount that was emitted in 1999.

Footnotes

***1**. Status of Ratification/Accession/Acceptance/Approval of the agreements on the protection of the stratospheric ozone layer, United Nations Environment Program, April, 9, 2001.*
***2**.* "What has EPA done about ozone depletion? And why does the U.S. need regulations to protect the ozone layer?," U.S. EPA, Web site - http://www.epa.gov/ozone/geninfo/actions.html.

Measures - notes and sources

***Measure 1**. Chemical transfers are those chemicals transferred for treatment or recycling. *Chemical releases and transfers of four new chemicals required to be reported in 1994. Source: Toxics Release Inventory Reports, U.S. EPA.*
***Measure 2**. Based on 1999 data. Source: U.S. EPA.*
***Measure 3**. Source: U.S. EPA.*